

Adaptive Magnetorheological Isolator for Ground Support Equipment, Phase I

Completed Technology Project (2008 - 2009)



Project Introduction

The minimization of vibration-induced damage has become a critical issue for rocket launch ground support electronics (GSE). GSE located near a major rocket launch can be exposed to damaging environments including heat, rocket plume impingement, vibration, and acoustics. This extreme vibratory environment results in the need for extensive check out and frequent repairs of GSE systems after each launch. Another consequence is the need for extensive design and qualification testing to ensure equipment survivability. Passive GSE vibration isolation systems often have natural resonances within the broad excitation spectrum, resulting in poor equipment protection. Additionally, passive isolation systems can only be tuned for one excitation type (amplitude / frequency) and one GSE rack arrangement. If the expected vibration spectrum changes, the passive isolation system is no longer optimized and requires redesign. Furthermore, if the inertial properties of the GSE rack itself changes (rack or drawer is replaced or rearranged), the passive isolation system will no longer function properly which may lead to catastrophic failure. To overcome these deficiencies, Techno-Sciences Inc, in collaboration with the University of Maryland, proposes to develop an innovative Adaptive Magnetorheological Isolator (AMI) system that will automatically adjust its energy absorbing capabilities to real-time environmental measurements as well as GSE rack properties. Such a system will utilize internal motion sensors coupled with an on-board microcontroller to provide automatic adaptation to the excitation as well as the inertial properties of the supported rack. In doing so, the system will eliminate damaging natural resonances and provide optimal vibration isolation at all times. Because of its adaptability and optimal vibration isolation capabilities, the AMI system will significantly reduce design and life-cycle costs and enhance equipment reliability.



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

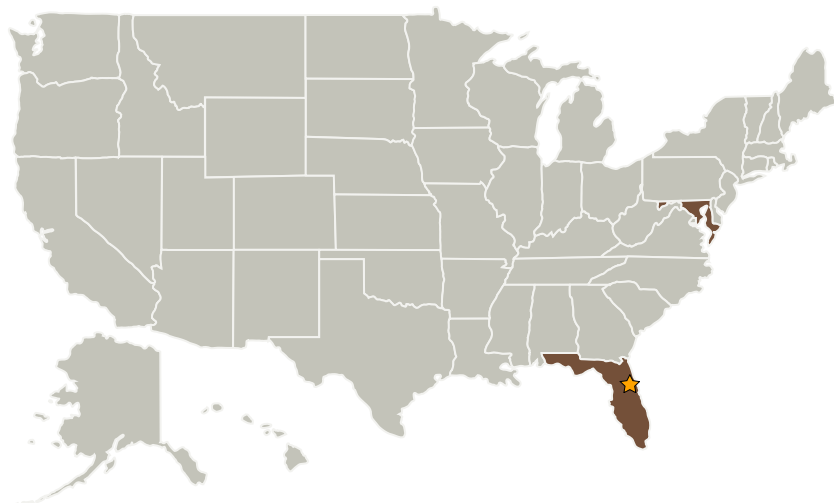
Small Business Innovation Research/Small Business Tech Transfer

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Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Techno-Sciences, Inc.	Supporting Organization	Industry	Beltsville, Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.5 Revolutionary Communications Technologies
 - └ TX05.5.3 Hybrid Radio and Optical Technologies

Primary U.S. Work Locations

Florida	Maryland
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